SATHYABAMA
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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Ref: EEE / BOS / 2021-2022 / Date: 3rd June, 2021

Minutes of Board of Studies Meeting held on 3rd June, 2021

Venue: Online

Zoom Credential:

Agenda

- Choosing of open elective / core elective course for the 4th semester students.
- To discuss about course swapping between 5th and 6th semester
- To Review and finalize the contents of newly framed and revised courses framedfor 2015 Regulation syllabus.
- Inclusion of Employability / entrepreneurship / higher studies enhancer course.as credit course.
- To discuss and finalize the weightage for NPTEL/SWAYAM and professional training courses.

Members present:

The following points were discussed during the meeting and the minutes were recorded as below:

- The Dean of School of Electrical and Electronics, Dr. N.M.Nandhitha greeted and welcomed all members of Board of Studies.
- In order to facilitate the students to choose open elective / core elective course from their 4th semester, Dr. V. Sivachidambaranathan, put forth the suggestion that Engineering Science course namely, "Applied Thermodynamics" can be given as elective course for the students. The members agreed the suggestion.
- Dr. V. Sivachidambaranathan insisted that the students study about "DC machines and Transformer" in the 2nd Semester and "AC machines in 3rd Semester. Therefore it would be more beneficial to have the subject "Electrical Machine Design" earlier in 6th Semester and It will be more beneficial to have DSP in 6th semester since the students have to study about "Principles of Embedded System Design" Theory and "Embedded and DSP lab" in 7th Semester.
- The members agreed the swapping of the courses "Digital Signal Processing and its Applications" in 5th semester and "Electrical Machine Design" in 6th Semester.

- Syllabus for three course in elective were revised and the copies were put in front of the panel of Board of Studies for their approval.The courses are as follows:
  - ✓ Electric Vehicle (Elective / CBCS)
  - ✓ Smart Grid (Elective / CBCS)
  - ✓ Green Energy Systems (Elective / CBCS)
- Dr. V. Sivachidambaranathan informed the panel that the content of syllabus for each subject along with its objectives, course outcomes was discussed in detail, taking into consideration of the prerequisite knowledge, references of Syllabi followed in other premier universities and feedback obtained from industries, Recruiters, Alumni and other experts in that subject. The topics in each subject were carefully scrutinized to have relevance to the latest technologies.
- Dr. Ramesh Babu explained the changes in the subject Electric vehicle. He informed that changes were made in units 4 and battery storage and charging is included in unit 5 as it meets the current trend. Dr. Prabu Ramanathan suggested to include regenerative breaking as it is the "key word' in syllabus.
- Dr.Sundarsingh Jebaseelan explained and justified the changes made in the subject Smart Grid. Similarly Mr. Barnabas Paul Glady explained the newly named course green energy systems. He mentioned that the earlier version of the subject was renewable energy sources. He explained that in unit 4 & 5 importance is given to hydrogen production and hybrid energy sources as it can fetch more funding and research opportunities.
- The External Members appreciated the content as well as the depth of syllabi and it was readily accepted.
- The process of professional training course was explained by Dr. Sivachidambaranathan in detail to the board members. Therefore, as per the suggestion received from the broad of studies members it was decided to have Employability / entrepreneurship / higher studies enhancer course as 1 credit course in 5th semester and 7th semester and Professional Training as 1 credit course in 5th semester and 4 credit course in 7th semester respectively.
- Also as per the recommendation received by the members it was finalized to provide 50% weightage for SWAYAM / NPTEL course completion certificate (Elite) and 50% weightage to industrial training in awarding marks for Professional Training.
- The Dean thanked the members for their suggestions and active participation in the meeting.

Name of the Course : Electric Vehicle

Course Code : SEE1611

Unit	Content	Inclusion / Deletion	Reason
I	**VEHICLE FUNDAMENTALS** General Description of Vehicle Movement, Vehicle Resistance, Dynamic Equation, Tire–Ground Adhesion and Maximum Tractive Effort, Power Train Tractive Effort and Vehicle Speed-Vehicle Power Plant and Transmission Characteristics-Vehicle Performance-Braking Performance-Performance of Electric Vehicles.		
II	**ELECTRIC VEHICLE FUNDAMENTALS** EV Types, EV Configurations, Energy Sources, Motors Used, Charging Systems, Power Conversion Techniques, Technological Problems, Control Algorithms, Trends and Future Developments		

III	**ELECTRIC TRAIN** Series Hybrid Electric Drive Train Design-Sizing of the Major Components- The Hybrid Electric Vehicle-Energy Use in Conventional Vehicles-Energy Savings Potential of Hybrid Drive trains-HEV Configurations-Series Hybrid System-Parallel Hybrid System-Series-Parallel System-Complex Hybrid System.		
IV	DC CHOPPERS AND INDUCTION MOTOR DRIVES ELECTRIC PROPULSION SYSTEM DC motor drive-Chopper control of DC motor drive- multi-quadrant control of Chopper fed drive Induction motor drive-constant v/f control-power electronics control-FOC-VSI for FOC		Unit V topics are merged
V	ELECTRIC PROPULSION SYSTEM PMBLDC motor drive-basic principle – construction-classification-performance and control of PMBLDC machine. SRM drive-basic magnetic		The content are included in Unit IV.

	structure-SRM drive converter-modes of operation-generating modes of operation.		
V	BATTERY STORAGE AND CHARGING Batteries-Overview-Types of battery-Fuel Cell-Super capacitor -Flywheel. Charging, standards and infrastructure-Wireless power transfer-Solar charging case study. Case studies-General motor EV-1 and Tesla roadster	Inclusion	As it is required for electric vehicle

Name of the Course : **SMART GRID**

Course Code : **SEEA3006**

Unit	Content	Inclusion / Deletion	Reason
I	**INTRODUCTION TO SMART GRID** **Evolution of Electric Grid, Concept, Definitions and Need for Smart Grid, Smart grid drivers, functions, opportunities, challenges and benefits, Difference between conventional & Smart Grid, Concept of Resilient & Self Healing Grid, Present development & International policies in Smart Grid, Diverse Prospective from experts and global Smart Grid initiatives.**		
II	SMART GRID TECHNOLOGIES Technology Drivers, Smart energy resources, Smart substations, Substation Automation, Feeder Automation, Transmission systems: EMS, FACTS and HVDC, Wide area monitoring, Protection and control, Distribution systems: DMS, Volt/VAr control, Fault Detection, Isolation and service restoration, Voltage Management, High-Efficiency Distribution Transformers, Phase Shifting Transformers, Plug in Hybrid Electric Vehicles (PHEV). SMART GRID ARCHITECTURE Components and Architecture of Smart Grid Design –Review of the proposed architectures for Smart Grid. The fundamental components of Smart Grid designs – Transmission Automation – Distribution Automation –Renewable Integration	Deletion Inclusion	Some of the topics are covered in other courses and design of smart grids are included.
III	SMART METERS AND ADVANCED METERING INFRASTRUCTURE Introduction to Smart Meters, Advanced Metering		

	infrastructure (AMI) drivers and benefits, AMI protocols, standards and initiatives, AMI needs in the smart grid, Phasor Measurement Unit(PMU), Intelligent Electronic Devices(IED) & their application for monitoring & protection.		
IV	**POWER QUALITY MANAGEMENT IN SMART GRID** Power Quality & EMC in Smart Grid, Power Quality issues of Grid connected Renewable Energy Sources, Power Quality Conditioners for Smart Grid, Web based Power Quality monitoring, Power Quality Audit.		
V	**HIGH PERFORMANCE COMPUTING FOR SMART GRID APPLICATIONS** Local Area Network (LAN), House Area Network (HAN), Wide Area Network (WAN), Broadband over Power line (BPL), IP based Protocols, Basics of Web Service and CLOUD Computing to make Smart Grids smarter, Cyber Security for Smart Grid.		

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SEEA3027	Green Energy Systems	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES

To understand the need and advantages of renewable energy.

To study the performance, efficiency and the relevancy to the future energy needs.

UNIT 1 INTRODUCTION 9 Hrs.

Overview of conventional & renewable energy sources, need, potential & development of renewable energy sources, types of renewable energy systems, Future of Energy Use, Present Indian and international energy scenario of conventional and RE sources, Energy for sustainable development, Environmental Aspects of Energy, Limitations of RE sources.

UNIT 2 SOLAR ENERGY 9 Hrs

Theory of solar cells - VI and PV curves - Equivalent circuit. Concept of solar PV module, Panel, Array, Maximum Power Point tracking - Solar PV systems - Solar Collectors Classifications–- Solar PV Applications- Solar Refrigeration - Solar Pond Power Plant - Solar Thermal Power Plant.

UNIT 3 WIND ENERGY 9 Hrs.

Wind Power and its Sources-Energy from Wind - Horizontal axis Wind Turbine - Vertical Axis Wind Turbine - Wind Energy Conversion Systems - Cp Vs Speed Curve.

UNIT 4 HYDROGEN PRODUCTION AND HYDROGEN STORAGE 9 Hrs.

Chemical Production of Hydrogen- Electrolytic Hydrogen- Thermolytic Hydrogen- Photolytic Hydrogen- Photobiologic Hydrogen Production- Compressed Gas- Cryogenic Hydrogen- Storage of Hydrogen - Adsorption- Chemical Compounds- Hydride Hydrogen Compressors- Hydride Heat Pumps.

UNIT 5 HYBRID RENEWABLE ENERGY SYSTEMS 9 Hrs.

Need for Hybrid Systems- Range and type of Hybrid systems - Configuration and Coordination, Electrical interface: wind-PV, Wind-PV-Fuel cell.

Max. 45 Hours

COURSE OUTCOMES

CO1 - Gain knowledge on the various classification of energy sources and their environmental issues

CO2 - Analyse the limitless availability of green energy sources

CO3 - Acquire the knowledge of the principles of solar energy conversion and their benefits

CO4 - Enable for building a small range of wind energy conversion system

CO5 - learn hydrogen production method and storage methods

CO6 - understand the challenges in renewable hybrid system

TEXT / REFERENCE BOOKS

1. Aldo Vieira da Rosa , Juan Carlos Ordonez,"Fundamentals of Renewable Energy Processes" -Elsevier academic press 4th Edition 2021
2. Janaka Ekanayake and Nicholas Jenkins "Renewable Energy Engineering"- Cambridge university press-2017
3. B Khan ,"Non conventional Energy resources", Tata McGrawHill, 2 nd Edition 2009.
4. Mukund R. Patel ,Wind & Solar Power Systems- Design, Analysis and Operation, , Taylor and Francis, 2nd Edition 2005.
5. James Larminie & Andrew Dicks, "Fuel Cell Systems Explained", John Wiely & Sons, 2nd Edition.
6. John Twideu and Tony Weir, "Renewal Energy Resources" BSP Publications, 2006.
7. C.S. Solanki, "Renewal Energy Technologies: A Practical Guide for Beginners" PHI Learning.